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New data on the distribution of lizards in Caucasus

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Abstract

New data on the distribution of four species of lizards (*Darevskia brauneri*, *D. daghestanica*, *Lacerta agilis ioriensis*, *L. strigata*) in the Caucasus are presented.

Key Words

Darevskia brauneri, *Darevskia daghestanica*, *Lacerta agilis ioriensis*, *Lacerta strigata*, Azerbaijan, Georgia

The Caucasus region is of particular interest for studying the biology of Lacertini lizards due to its high endemism and overall species richness. Endemics include five subspecies of *Lacerta agilis* Linnaeus, 1758 and about 18 species of *Darevskia* Arribas, 1997, out of 32 or 34 total (Uetz et al. 2018, http://www.lacerta.de, respectively).

By combining field work in Georgia in 2012 and 2018 and examining the collection of the Zoological Institute of the Russian Academy of Sciences (ZISP), we obtained data on the distribution of four taxa of *Darevskia* and *Lacerta*. We recorded coordinates and elevations of localities using a hand-held Garmin GPS (+/– 10 m, WGS 1984). An overview of the localities is shown in Fig. 1.

We recorded a previously unknown population of *D. brauneri* (Méhely, 1909) (Fig. 2) in the vicinity of Dzhvarboseli village, Kakheti, Georgia (42.4196N, 45.4953E; ~1930 m elevation) in the valley of the Tushetis Alazani River (Fig. 3). On the August 11, 2012 six specimens were collected at the edge of the forest (3 specimens deposited at ZISP, № 29863-29865; 3 specimens at the Institute of Zoology of Ilia State University, IZISU, not catalogued; coll. D. Bekoshvili). We measured a set of morphological characters (using digital calipers to the nearest 0.1 mm) to verify the taxonomic status of the population (Table 1). The closest known locality is the west in South Ossetia

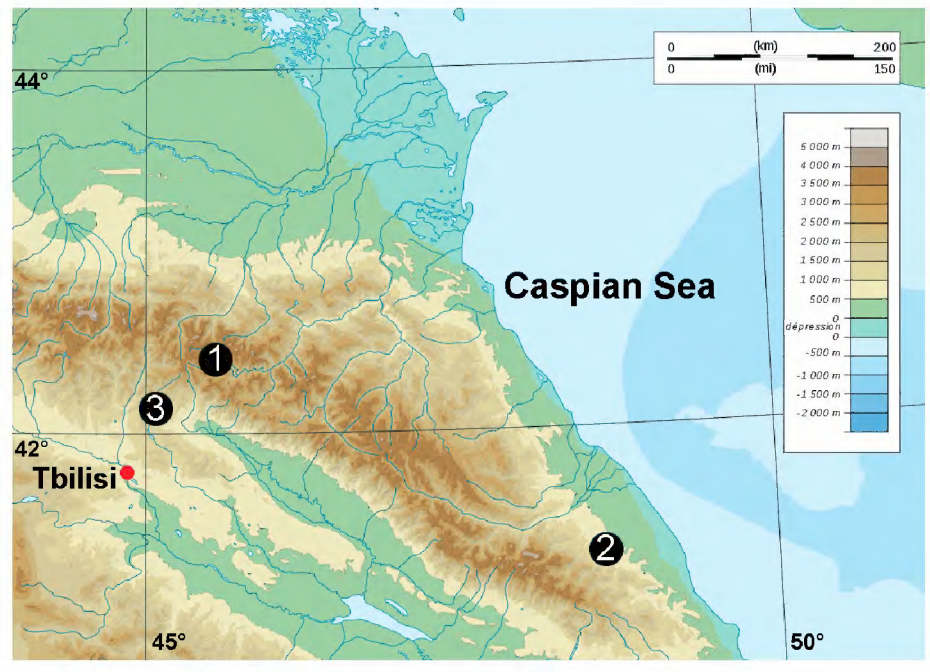

Figure 1. Locality records for lizards in the Caucasus: 1) *Darevskia brauneri*, vicinity of the Dzhvarboseli village. 2) *D. daghestanica*, Teng-Alty (=Tengyaalty) village. 3) *Lacerta agilis* and *L. strigata*, Tianeti village.

– the area of Erso Lake (42.4680N, 43.7522E; ~1860 m elevation; Doronin 2013; Tuniyev et al. 2017), a straight-line distance of 143 km. Thus, we provide the easternmost record for the species. Probably other populations exist in the suitable habitats between these two localities.

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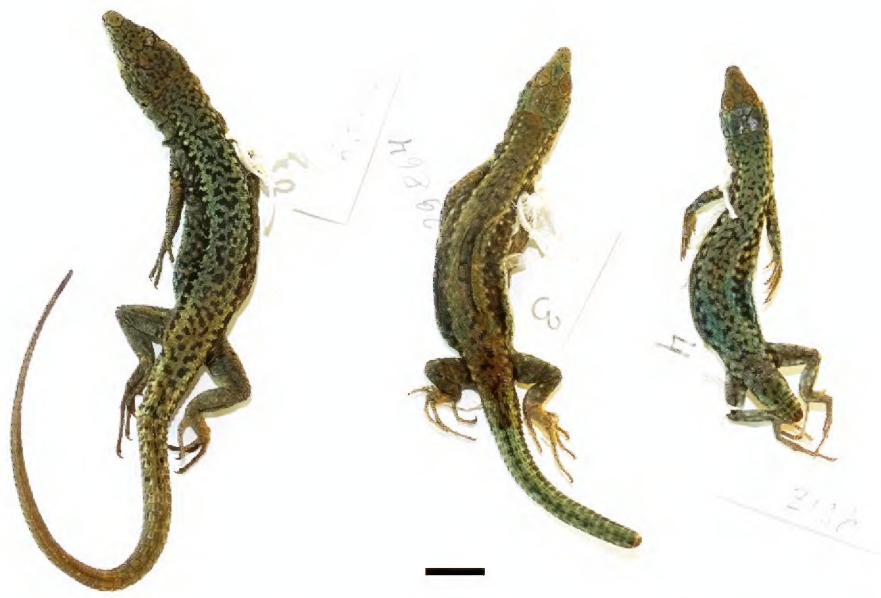

Figure 2. *Darevskia brauneri* (Méhely, 1909), vicinity of Dzhvarboseli village (ZISP № 29863-29865). Dorsal view. Scale bar is 1 cm (photograph by I. V. Doronin).

Figure 3. The vicinity of Dzhvarboseli village (photograph by A. Bukhnikashvili).

Because the systematics of the *D. (saxicola)* complex is controversial (Tarkhnishvili et al. 2016), it is necessary to compare the morphology of specimens from the western populations and new geographically remote population of *D. brauneri*, to obtain genetic data. For this reason, we do not present here the definition of subspecies.

In the collection of the ZISP we found 7 specimens of *D. daghestanica* (Darevsky, 1967) (ZISP № 29711-29717; coll. S. Ahmedov, collection date is not specified; Fig. 4) caught on the right bank of the Velve-Chay River, Teng-Alty (= Tengyaalty) village, Quba District, Azerbaijan (41.2072N, 48.6258E; ~650 m elevation). This is the easternmost distribution record for this species. Now we know of five reliable records (with this publication) of this species in Azerbaijan: 1. Bumskoe Gorge, Qabala District (41.0566N, 47.8551E; ~1430 m elevation; Museum of Nature at V. N. Karazin's Kharkiv National University № 27256; Zinenko & Goncharenko 2011); 2. Alpine meadows in the vicinity of the Zaqatala city, Zaqatala District (41.7153N, 46.8075E; ~2000 m elevation; ZISP № 21260); 3. Oğuz (=Vartashen) city, Oghuz District (41.0848N, 47.4654E; ~750 m elevation; ZISP № 17957); 4. Area of the Shahdagh Mount, Qusar District (~41.2857N, 48.0937E; 1700–1780 m elevation) (Foto T. Panner in www.lacerta.de).

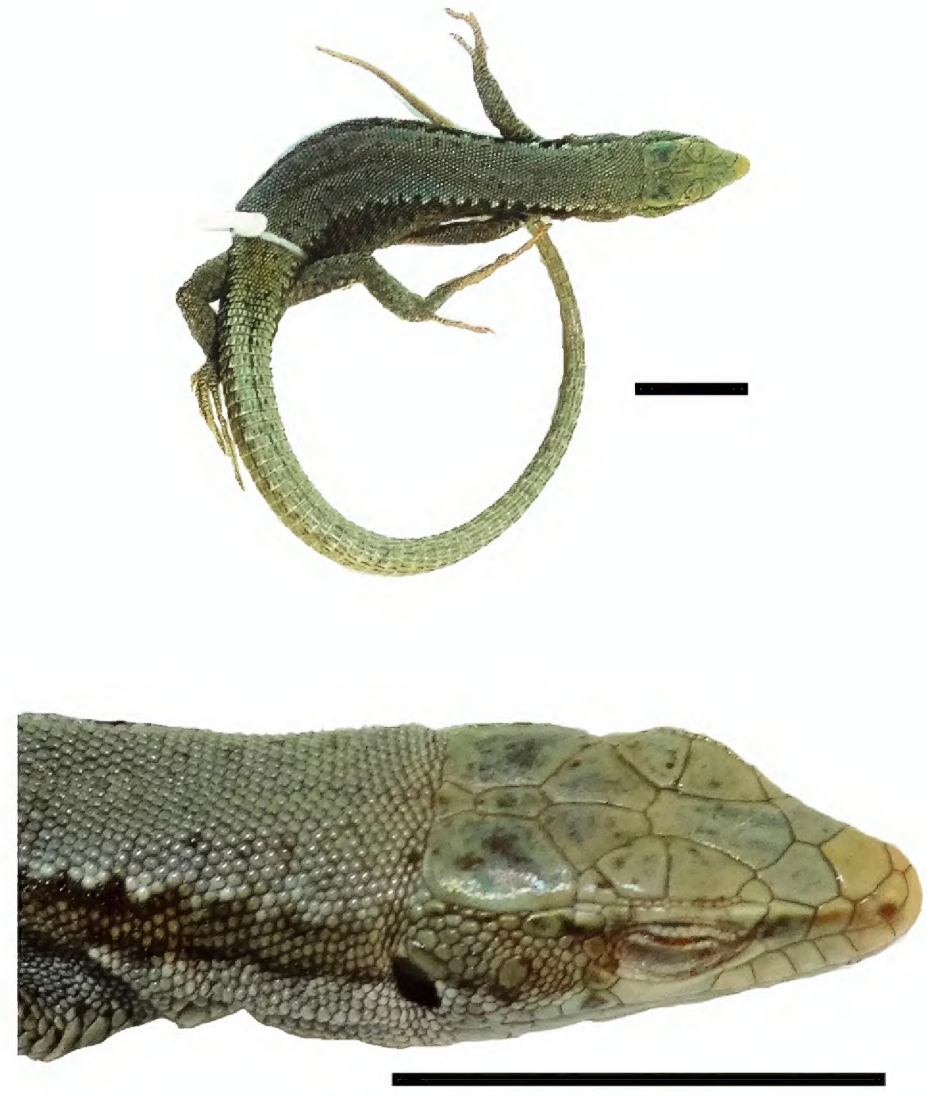

Figure 4. *Darevskia daghestanica* (Darevsky, 1967), Teng-Alty (=Tengyaalty) village (ZISP № 29711). Dorsal and right lateral view of the head in an adult male. Scale bar is 1 cm (photograph by I. V. Doronin).

Among the subspecies of *L. agilis*, *L. a. ioriensis* Peters et Muskhelischwili, 1968 has the smallest distribution. It has been described only from the territory of Tianeti village, Mtskheta-Mtianeti Region, Georgia located in the valley of the Iori River, between Kakhetinsky and Kartlinsky (=Kartalinsky) Ridges on the southern slope of the Greater Caucasus Range. For the original species description 59 specimens were collected from a grove of young elm seedlings, in an abandoned field on August 23–25, 1965 and July 19–23, 1966 (Peters and Muskhelischwili 1968). During the preparation of the monograph "Sand Lizard" (Yablokov 1976) in the 1970s (exact dates are not provided in the text) A. S. Baranov, A. V. Yablokov and A. V. Valetsky studied this population. They discovered this subspecies in the rare elm plantings in the floodplain of the river in the ravines. According to their calculations, the dimensions of this area was 120×600 m, with an approximate number of non-juvenile lizards at about 2000 to 3000. For many kilometers around, they did not find any other *L. agilis*. In the collection of the Zoological Museum of Moscow University exist 101 specimens of this subspecies (ZMMU № R 7762, 9034, 10295). They were collected by A. S. Baranov, A. V. Yablokov and A. V. Valetsky on May 4–5, 1971, dates similar to those noted in the monograph (Yablokov 1976).

On May 26, 2002 W. Bischoff (2003) visited Tianeti but did not find *L. a. ioriensis*. Between August 31 to

Table 1. Main morphological characters of specimens of *Darevskia brauneri* (Méhely, 1909) described in the paper. Measurements are given in mm.

Sex	Characters												
	L.	L. cd.	Pil.	Lt. c.	Al. c.	Mas. (left/right)	Mas./Tym. (left/right)	Sup. gran. (left/right)	Sup. (left/right)	G.	Sq.	P. fm. (left/right)	Pr. an.1/ Pr. an.2
ad. ♂	61	–	15.9	10.1	6.6	+/+	3/3	14/13	5/4	28	63	18/20	9/0
ad. ♂	56	121	14.2	8.7	5.9	++/+	3/3	11/13	3/2	25	58	18/20	10/0
ad. ♀	59	–	12.6	8	4.8	+/+	3/4	14/14	3/3	27	62	20/18	8/2
ad. ♀	54	–	12.1	7.3	4.6	(+)/(+)	4/4	12/12	4/4	33	62	19/18	10/0
subad. ♂	51	–	11.2	7	4.3	++/++	3/3	14/13	4/4	31	59	19/19	10/0
subad. ♂	45	89	10.8	6.5	4.7	+/+	6/6	13/13	4/4	29	68	19/19	8/2
M±m							3.66±0.88/ 3.83±0.83	13.00±1.00/ 13.00±0.33	3.83±0.55/ 3.50±0.66	28.83±2.16	62±2.33	18.83±0.55/ 19.00±0.66	9.16±0.83/ 0.67±0.90

Note. L. (Longitudo corporis) – length of body from tip of snout to cloaca; L. cd. (Longitudo caudalis) – tail length: [–] tail regeneration or missing; Pil. (Pileus) – length from the tip of snout to the posterior edge of the parietal shields; Lt. c. (Latitudo capitis) – maximum width of head; Al. c. (Altitudo capitis) – head height near the occipital scales; Mas. (Masseteric) – the presence and size of the central temporal scale: [++] very large, [+] large, [(+)] mid-sized; Mas./Tym. (Masseteric/Tympanum) – the number of scales along the most narrow distance between the central temporal and drum scales; Sup. gran. (Supraciliary granules) – the number of granules between the supraoculars and superciliaries scales; Sup. (Supratemporalia) – the number of scales along the edge of the parietal shield for supratemporals; G. (Gularia) – the number of gular scales line between the middle of the collar and a compound mandibular scales; Sq. (Squamae) – the number of dorsal scales in a transverse row around the middle of the body; P. fm. (Pori femoralis) – the number of femoral pores; Pr. an.1 (Scuta preanalia) – the number of preanal scales in the front row; Pr. an.2 – the number of enlarged preanal scales.

Figure 5. *Lacerta strigata* Eichwald, 1831, Tianeti village (photograph by I. V. Doronin).

Figure 6. *Lacerta agilis ioriensis* Peters et Muskhelischwili, 1968, Tianeti village (ZISP № 29878) (photograph by I. V. Doronin and M. A. Doronina).

September 1, 2009, R. Nessing (2011) was able to find only 3 specimens.

The information about a new population of this lizard discovered in the Iori River valley near Sakdrkoni (=Sakdrioni) in May 2007 and 2012 (Frotzler and Bader 2009; Pannet 2014) requires confirmation as these publications do not contain data on the morphology of the specimens.

We conducted sampling on the territory and in the vicinity of Tianeti on May 18–19, 2018. May is the time of the highest activity of the green lizards in the Caucasus. Among the reptiles in this area, *L. strigata* Eichwald, 1831 dominated (ZISP № 29872-29877; Fig. 5): its population was estimated to be 26 specimens / 1 km of the survey route. Previously, no one has reported it for this locality. The specimens of *L. a. ioriensis* (ZISP № 29878-29879; Fig. 6) were found only on the northern outskirts of Tianeti: on the slope of Kartalinsky Ridge (42.1299N, 44.9686E; ~1185 m elevation), and lower in the Iori River valley (42.1255N, 44.9745E; ~1119 m elevation; Fig. 7). We found 7 specimens (2 adult males and 5 subadults) / 1.5 km of the survey route in suitable biotopes. In the second biotope on the rubbish dump, *L. a. ioriensis* occurred syntopically with *L. strigata*. We did not find any specimens of *L. agilis* further than 2 km from Tianeti. It is possible that the subspecies exists only as a single population. The population size is now less than 1000 specimens

Figure 7. The valley of the Iori River in the Tianeti village (photograph by I. V. Doronin).

(following the classification of populations of this species in the monograph Yablokov 1976), making this one of the rarest taxa in the genus *Lacerta*. In our opinion, the main natural limiting factors for this subspecies are the severe mountain climate and competition with *L. strigata*. We identified an anthropogenic factor causing destruction of its habitat, namely extraction of sand and rubble from the river valley. Due to its limited distribution and small population size, this lizard is very vulnerable and can rapidly disappear under adverse conditions. The effective method of protection could be the use of zoo culture and the creation of new populations through the reintroduction of captive bred lizards. Although this is a promising direction for protection of the herpetofauna (Ananjeva et al. 2015), we believe that the most effective conservation can be achieved through the creation of a protected area at this territory and a long-term monitoring of this population.

Acknowledgments

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